## PVD DEPOSITION PROCESS FOR ENHANCED PROPERTIES OF METAL FILMS

Michael Rumer, Jack Griswold, Tom Dorsh, Michael Ng, David E. Reedy, Paul D. Healey, Michael Danek, and Reed W. Rosenberg

5

10

15

## ABSTRACT OF THE DISCLOSURE

A physical vapor deposition sputtering process for enhancing the <0002> preferred orientation of a titanium layer uses hydrogen before or during the deposition process. Using the oriented titanium layer as a base layer for a titanium, titanium nitride, aluminum interconnect stack results in formation of an aluminum layer with predominant <111> crystallographic orientation which provides enhanced resistance to electromigration. In one process, a mixture of an inert gas, usually argon, and hydrogen is used as the sputtering gas for PVD deposition of titanium in place of pure argon. Alternatively, titanium is deposited in a two-step process in which an initial burst of hydrogen is introduced into the reaction chamber in a separate, first step. Pure argon is used as the sputtering gas for the titanium deposition in a second step. The method is broadly applicable to the deposition of metallization layers.